EXHIBIT 3

VRAM
(Video RAM)

Manufacturer: Kingston®
Speed: **60 ns**
Year Introduced:
Frequency:
Burst Timing:
Pins: **300-pin PLCC**
Voltage: **3.3v**
Bandwidth: **200MBps**

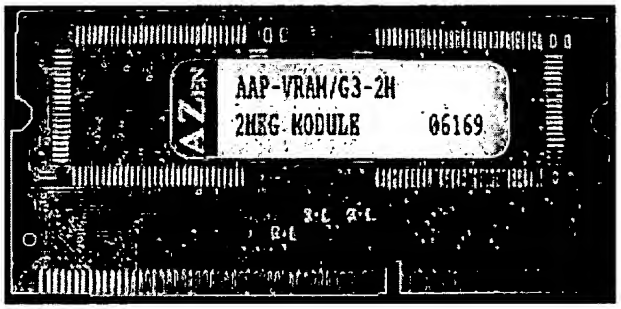
Video RAM. DRAM with an on-board serial register/serial access memory designed for video applications.

Graphics memory must work very quickly to update, or refresh, the screen (60-70 times a second) in order to prevent screen "flicker." At the same time, graphics memory must respond very quickly to the CPU or graphics controller in order to change the image on screen. With ordinary DRAM, the CRT and CPU must compete for a single data port, causing a bottleneck of data traffic.

VRAM is a "dual-ported" memory that solves this problem by using two separate data ports. One port is dedicated to the CRT, for refreshing and updating the image on the screen. The second port is dedicated for use by the CPU or graphics controller, for changing the image data stored in memory.

VRAM works much like a fast food drive-through that uses two windows. After you place an order, you pay at one window, then drive up and get your food at the next window. This makes the process faster and more efficient.

For a mode like 1024x768x256 with 80 Hz refresh, the amount of bandwidth taken up by monitor refresh is approximately 1024 * 768 * 80 = 63 Mb/s, which with overhead added works out to about 75 Mb/s of video memory bandwidth.



Main Menu

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